Standard Features:

- Display Format: 24 Characters x 2 Lines
- Input Data: 4 Bit or 8 Bit Interface Available
- Driving Method: 1/16 Duty, 1/5 Bias

2. MECHANICAL SPECIFICATIONS:

Item	Specification	Unit
Maximum Module Size	118 (W) X 36 (H) X 11 (LED:15) (T)	mm
Viewing Area	93.5 (W) X 15.8 (H)	mm
Character Font	5 X 7	dots
Character Size	3.20 (W) X 4.85 (H)	mm
Character Pitch	3.70 (W) X 5.95 (H)	mm
Dot Size	0.60 (W) X 0.65 (H)	mm
Weight	55 without backlight, 60 with backlight	g

3. ELECTRICAL SPECIFICATIONS:

3-1 ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Value			Unit	Condition
		Min.	Typ.	Max.		
Logic Supply Voltage	Vdd-Vss	0	-	7.0	V	Ta = 25 °C
LCD Drive Supply Voltage	Vdd-Vo	0	-	13.5	V	Ta = 25 °C
Input Voltage	Vi	-0.3	-	Vdd +0.3	V	Ta = 25 °C
Operating Temperature (Std)	Ta	0	-	+50	°C	-
Storage Temperature (Std)	Tstg	-20	-	+60	°C	-
Operating Temperature (Ext)	Ta	-20	-	+70	°C	-
Storage Temperature (Ext)	Tstg	-30	-	+80	°C	-

3-2 ELECTRICAL CHARACTERISTICS

Item	Symbol	Value			Unit	Condition
		Min.	Typ.	Max.		
Logic Supply Voltage	Vdd-Vss	4.75	5.00	5.25	V	
Logic Supply Current	Idd	-	2.0	3.0	mA	Vdd = 5V
LCD Supply Current	Io	-	1.0	1.5	mA	Vdd = 5V
LCD Operating Voltage	Vdd-Vo	4.4	4.6 (8.1)	4.8	V	Ta = 0 °C Note 1
		4.2 (7.5)	4.4 (7.8)	4.6 (8.1)	V	Ta = 25 °C Note 1
		4.1	4.2 (7.5)	4.3	V	Ta = 50 °C Note 1
Power Consumption	Pd	-	17.8	27.0	mW	Vdd = 5v
Input Voltage "High" Level	V_{IH}	2.20	-	Vdd	V	
Input Voltage "Low" Level	V_{IL}	-0.3	-	0.6	V	
Output Voltage "High" Level	V_{OH}	2.40	-	-	V	
Output Voltage "Low" Level	V_{OL}	-	-	0.4	V	
Frame Frequency	Fr	-	84.3	-	Hz	Fosc=270KHz
Oscillation Frequency	Fosc	190	270	350	Khz	R=91kΩ

Note 1: ( ) value is extended temperature fluid version.

3-3 BACKLIGHTING - EL UNIT

3-3-1 Absolute Maximum Ratings

Item	Symbol	Condition	Min.	Max.	Unit
Applied Voltage	Va	Ta = 25 °C	-	150	AC Vrms
Applied Frequency	Fa	Ta = 25 °C	-	1000	Hz

3-3-2 Optoelectric Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Applied Voltage	Va	Ta = 25 °C	80	100	120	AC Vrms
Applied Frequency	Fa		-	400	-	Hz
Current	Ia	Va = 100	-	2.73	-	mA
Power	Pd	Fa = 400	-	273	-	mW
Luminous		Va = 100- Fa = 400	45	55	-	cd/m^2

3-4 BACKLIGHTING - LED UNIT

3-4-1 Absolute Maximum Ratings

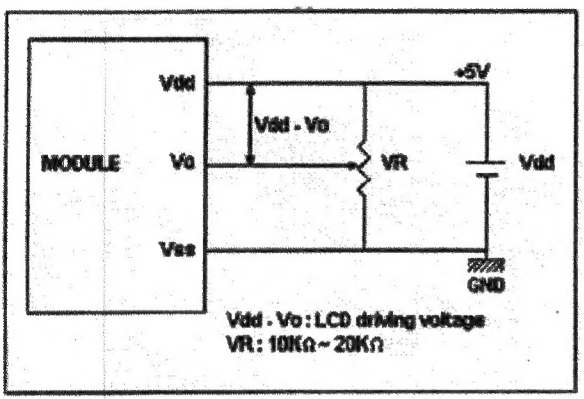
Item	Symbol	Condition	Min.	Max.	Unit
ForwardCurrent	If	Ta = 25 °C	-	260	mA
Applied Voltage	Vr	Ta = 25 °C	-	10	V
Power Dissipation	Pd	Ta = 25 °C	-	1118	mW

3-4-2 Optoelectric Characteristics

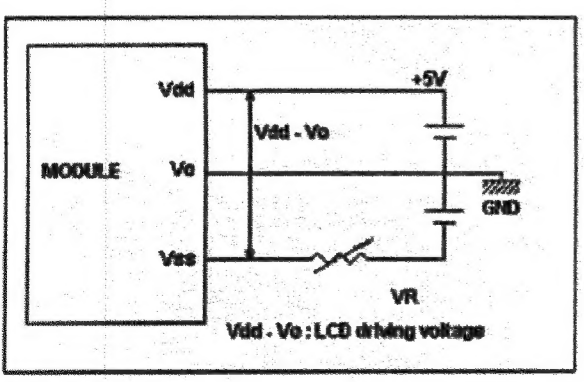
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage	Vf	Ta = 25 °C	3.9	4.1	4.3	V
Power	Pd		-	697		mW
Luminous		If = 104mA	70	-	-	cd/m^2

4. POWER SUPPLY

4-1 Standard Fluid Power Supply



4-2 Extended Temperature Fluid Power Supply



5. ELECTRO-OPTICAL CHARACTERISTICS

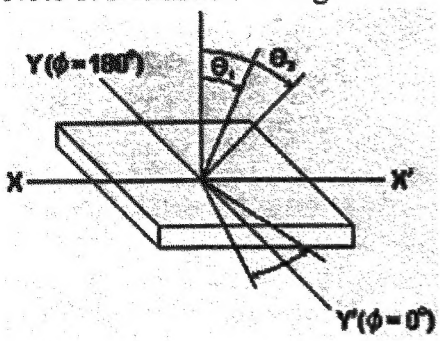
5-1 STN Fluid Electro-optical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Condition	Note
Viewing Angle	$\theta_2 - \theta_1$	70		90	deg	Cr = 2.0	1, 2
	ϕ	-90					
Contrast Ratio	Cr	2	4	-	-	$\theta = 20^o$ $\phi = 0^o$	3
Response Time (rise)	Tr	-	110	200	ms	$\theta = 20^o$ $\phi = 0^o$	4
Response Time (fall)	Tf	-	120	240	ms	$\theta = 20^o$ $\phi = 0^o$	4

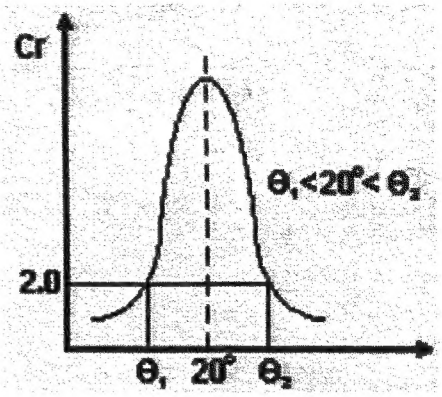
5-2 TN & Ext Temp STN Fluid Electro-optical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Condition	Note
Viewing Angle	$\theta_2 - \theta_1$	70	-	-	deg	Cr = 2.0	1, 2
	ϕ	-90		+90			
Contrast Ratio	Cr	2	4	-	-	$\theta = 0^o$ $\phi = 0^o$	3
Response Time (rise)	Tr	-	150	300	ms	$\theta = 0^o$ $\phi = 0^o$	4
Response Time (fall)	Tf	-	150	300	ms	$\theta = 0^o$ $\phi = 0^o$	4

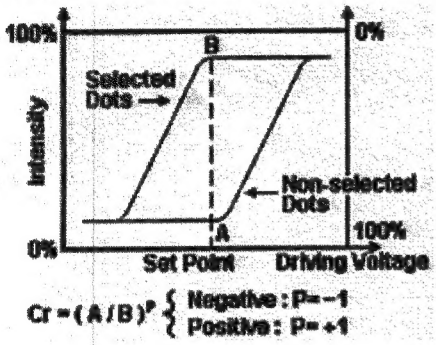
Note 1: Definition of angle θ&ϕ



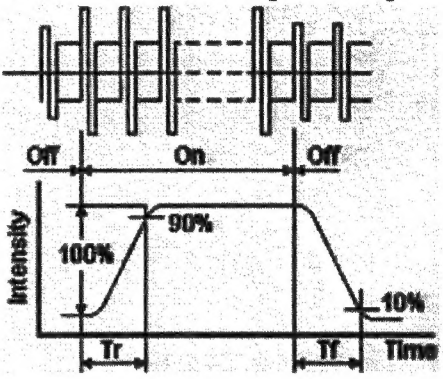
Note 2: Definition of viewing angle θ_2 & θ_1



Note 3: Definition of contrast Cr



Note 4: Definition of optical response

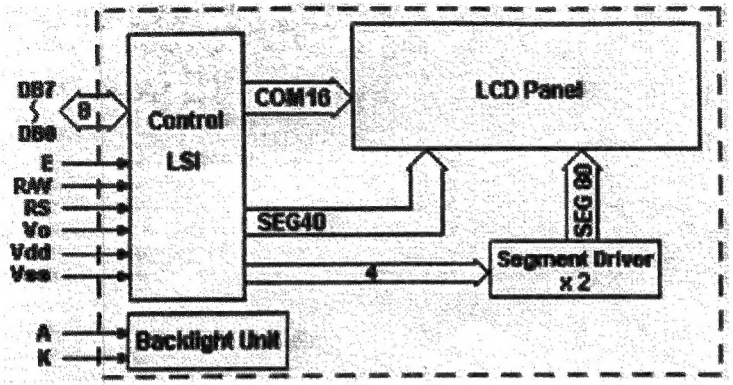


6. PIN ASSIGNMENT

Pin Number	Symbol	Level	Function
1	Vss	0V	0 V
2	Vdd	5V	+5 V
3	Vo	-	LCD Driving Voltage
4	RS	H/L	H : Data Input L : Instructin Code
5	R/W	H/L	H : Data Read L : Data Write
6	E	H,H	Enable Signal R/W = Low: Data are taking over at falling edge R/W = High: Data can be read at E=1
7	DB0		Data Bus-Lines - Software selectable 4 or 8 bit mode
8	DB1		
9	DB2		
10	DB3		
11	DB4		
12	DB5		
13	DB6		
14	DB7		
15	A	+	LED or EL connection
16	K	-	LED or EL connection

7. TIMING CHARACTERISTICS See specification for Hitachi **HD44780**

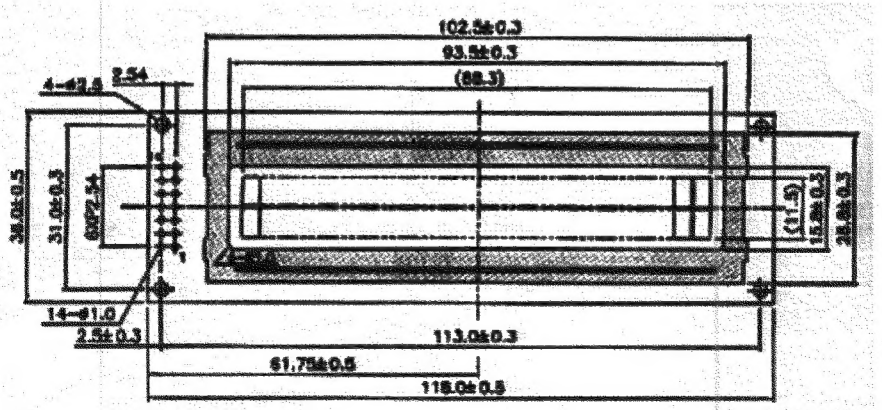
8. BLOCK DIAGRAM

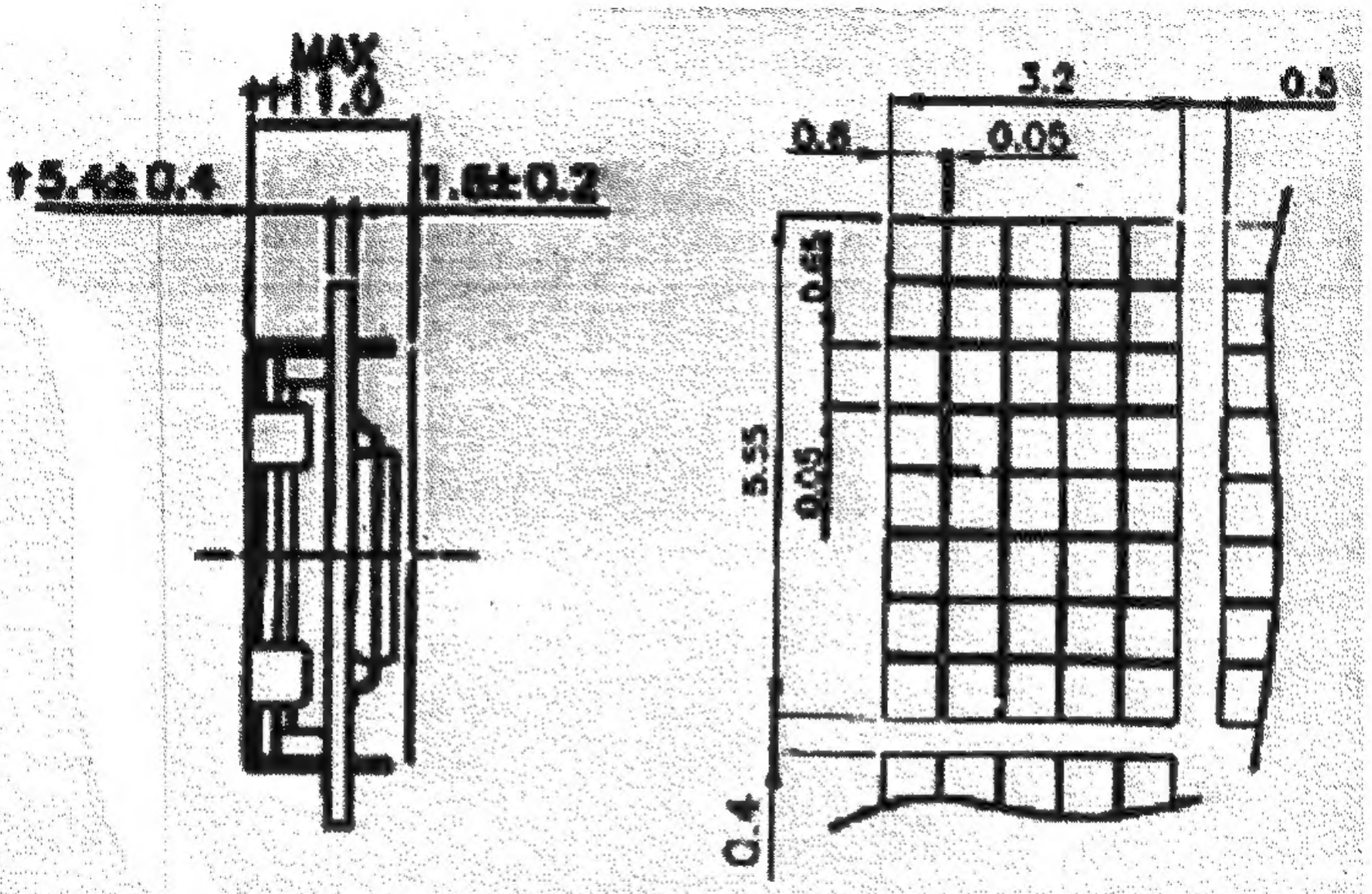


9. INSTRUCTION SET See specification for Hitachi **HD44780**

10. CHARACTER FONT TABLE See specification for Hitachi **HD44780**

11. EXTERNAL DIMENSION





† LED BACKLIGHT VERSION = 9.4

†† LED BACKLIGHT VERSION = 13.0

Unit : mm